

## SECTION 633 DELINEATOR POSTS AND DELINEATORS

### 633.1 Description

- (1) This section describes furnishing and erecting delineator posts and delineators, as the plans show.

### 633.2 Materials

#### 633.2.1 Steel Delineator Posts

- (1) Provide a flanged channel section post weighing 1.12 pounds per linear foot (1.67 kg/m) or more before zinc coating, and made of steel with the following properties:
  - Minimum tensile strength.....50 ksi (345 MPa)
  - Minimum tensile yield strength .....36 ksi (250 MPa)
  - Minimum elongation..... 5.0 percent in 2 inches (50 mm)
- (2) Provide posts the length, and with mounting holes the size and spacing the plans show. Ensure the posts are symmetrical, well rolled, and free from defects that impair their strength or appearance.
- (3) Hot-dip zinc coat the posts after completing all forming, cutting, punching or drilling. Perform zinc coating according to AASHTO M 111.

#### 633.2.2 Flexible Delineator Posts

- (1) Provide posts from an approved manufacturer listed on the department's approved products list.

#### 633.2.3 Delineator Brackets

- (1) Provide either structural steel or aluminum brackets for mounting delineators on concrete barriers or other structures. For structural steel brackets, conform to 506.2.2 and zinc coat the finished bracket as specified in 633.2.1. For aluminum brackets, conform to ASTM B 221, alloy 6061-T6. Provide stainless steel self-locking nuts, bolts, and washers conforming to 513.2.2.5.

#### 633.2.4 Delineators

##### 633.2.4.1 General

- (1) Furnish delineator units consisting of an approximately 3 inch (75 mm) circular hermetically sealed, acrylic plastic prismatic, reflex reflector, housed in embossed aluminum, and provided with a single grommeted mounting hole or provide a flexible plastic post from the department's approved products list, complete with a 3 inch (75 mm) x 9 inch (225 mm) reflective sheet conforming to 637.2.2.2.
- (2) Obtain the engineer's approval for the type and quality of acrylic plastic reflex reflectors used.
- (3) Unless specified otherwise, furnish a delineator conforming to the following:
  1. Provide a housing 0.020 inch (0.50 mm) thick, of 5052-H32, 5052-0 or 3003-H 14 of ASTM B 209 aluminum formed to approximately 3.25 inches (83 mm) in diameter and 0.235 inches (6 mm) in depth to retain the acrylic reflector.
  2. Mark the housing with the part number and the name of the manufacturer.
  3. Provide an expanded aluminum grommet with a 3/16-inch (5 mm) inside diameter expanded within the reflector-mounting hole.
- (4) Furnish a reflector with the following characteristics:
  1. Having a clear plastic base.
  2. Seven square inches (4500 mm<sup>2</sup>) of reflective area, called the lens.
  3. A heat sealable plastic or plastic-coated metallic foil back, fused to the lens under heat and pressure around its perimeter and the central mounting hole to form a unit sealed against dust, water, and vapor.
  4. For reflector color, use the color specified in the MUTCD.
- (5) Provide a lens with a smooth front surface; free from protrusions or indentations, other than a central mounting hole and identification, with a prismatic pattern on the rear surface, that results in total internal reflection of light. Ensure that the manufacturer's trademark is molded legibly in the lens face.

##### 633.2.4.2 Reflecting Requirements

- (1) Regardless of reflector orientation, the brightness of each reflector shall equal or exceed the following:

|                  |                |                            |
|------------------|----------------|----------------------------|
| DIVERGENCE ANGLE | ENTRANCE ANGLE | MINIMUM SPECIFIC INTENSITY |
|------------------|----------------|----------------------------|

| in degrees | in degrees | in candela/foot-candle (cd/lx) |          |
|------------|------------|--------------------------------|----------|
|            |            | CRYSTAL                        | YELLOW   |
| 0.1        | 0          | 115 (10.7)                     | 70 (6.5) |
| 0.1        | 20         | 45 (4.2)                       | 25 (2.3) |

- (2) The entrance angle is the angle at the reflector between the direction of light incident on it and the direction of the reflector axis.
- (3) The divergence angle is the angle at the reflector between the observer's line of sight and the axis of the incident light beam.
- (4) The engineer will reject reflectors that do not conform to the above minimum intensity values. If 5 percent or more of the tested samples fail, the engineer will reject the entire lot or shipment.

#### **633.2.4.3 Mounting Hardware**

- (1) For mounting hardware, use engineer-approved aluminum connectors of a vandal-resistant type, unless specified otherwise.

#### **633.2.4.4 (Vacant)**

#### **633.2.5 Temporary Delineators**

- (1) Furnish new temporary delineators and new temporary delineator posts conforming to 633.2.
- (2) If the engineer approves, the contractor may furnish used posts. Upon contract completion, all temporary delineators and temporary delineator posts become the contractor's property.

### **633.3 Construction**

#### **633.3.1 Erecting Delineator Posts and Brackets**

- (1) Under the Delineator Posts bid items, erect steel or flexible plastic posts to support delineators or small signs.
- (2) Under the Delineator Brackets bid item, provide zinc coated steel or aluminum angles or brackets to support delineators mounted on concrete barriers or other structures.
- (3) Set the posts and steel or aluminum brackets for the delineators at the locations and offsets the plans show or the engineer directs.
- (4) Erect the posts to a true vertical position by driving with equipment that does not damage the post. The contractor shall remove and replace all posts bent or damaged otherwise by it's own operations at no expense to the department. Drive the posts into the ground according to plan details, unless specified otherwise.
- (5) Mount delineator brackets with stainless steel bolts, anchors, and gaskets if required, according to plan details.
- (6) Under the Delineator Posts Flexible bid item, the curved side of the post is to face in the direction of travel on the roadway.

#### **633.3.2 Installing Delineators**

- (1) Under the Delineators bid item, erect reflector units on steel or wood marker posts, or on structures.
- (2) Assemble the delineators in the field, for mounting according to the plans requirements, as single delineators or double delineators.
- (3) Mount the center of the top delineator unit at the height the plans show.
- (4) Attach each delineator unit securely to the supporting steel post. If placing on structures, mount according to plan details.
- (5) If required, attach delineator units to marker posts with aluminum screw-nails according to plan details. Notch the marker post to accept the delineator unit or units, and drill or saw the base of the post if required, all as the plans show.

#### **633.3.3 Temporary Delineators**

- (1) Under the Temporary Delineators bid item, provide, install, and remove temporary delineators and temporary delineator posts.

## **633.4 Measurement**

### **633.4.1 Delineator Posts and Delineator Brackets**

- (1) The department will measure Delineator Posts Steel, Delineator Posts Flexible, and Delineator Brackets by each individual post or bracket acceptably completed.

### **633.4.2 Delineators and Temporary Delineators**

- (1) The department will measure Delineators and Delineators Temporary by each individual reflector acceptably completed.

## **633.5 Payment**

### **633.5.1 General**

- (1) The department will pay for measured quantities at the contract unit price under the following bid items:

| <u>ITEM NUMBER</u> | <u>DESCRIPTION</u>        | <u>UNIT</u> |
|--------------------|---------------------------|-------------|
| 633.0100           | Delineator Posts Steel    | EACH        |
| 633.0200           | Delineator Posts Flexible | EACH        |
| 633.0500           | Delineators               | EACH        |
| 633.1000           | Delineator Brackets       | EACH        |
| 633.1100           | Delineators Temporary     | EACH        |

### **633.5.2 Delineator Posts**

- (1) Payment for Delineator Posts Steel and Delineator Posts Flexible is full compensation for providing and erecting the posts; and for removing and disposing of surplus materials, contractor damaged posts, and debris.

### **633.5.3 Delineators**

- (1) Payment for Delineators is full compensation for providing and mounting the delineator, including bolts, nuts, washers, screw-nails, or other connectors.

### **633.5.4 Delineator Brackets**

- (1) Payment for Delineator Brackets is full compensation for providing and erecting the brackets, including anchors, bolts, and gaskets.

### **633.5.5 Temporary Delineators**

- (1) Payment for Delineators Temporary is full compensation for providing, installing, and removing delineators and delineator posts.
- (2) The department will not pay for replacement of temporary delineators and temporary delineator posts damaged during construction.